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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Applicant's or agent's file reference 29084	Date of mailing *(day/month/year)* 04 JAN 2006 **FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IL05/00559	30 May 2005 (30.05.2005)	30 May 2004 (30.05.2004)

International Patent Classification (IPC) or both national classification and IPC

IPC(7): C09D11/00, 11/10 and US Cl.: 523/160; 106/31.27, 31.60

Applicant

KORNIT DIGITAL LTD.

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(*b*) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	09 December 2005 (09.12.2005)	Callie Shosho Telephone No. 571-272-1700

Form PCT/ISA/237 (cover sheet) (April 2005)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 4-5,7-8,14-15,22,25-26,29,46-56	YES
	Claims 1-3,6,10-13,16-21,23-24,27-28,30-43	NO
Inventive step (IS)	Claims 9,44-45	YES
	Claims 1-8,10-43,46-56	NO
Industrial applicability (IA)	Claims 1-56	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 10-11 and 16-56 are objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or contents thereof:

(a) Claims 10-11, 42, 44, 46, and 49-50 are objected to as being in improper form because a multiple dependent claim should refer to other claims in the alternative only.

(b) Claims 16, 18, 23, 30, 32-33, 36-37, 39, 41, and 43 are objected to as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim.

(c) Claims 16-56 are objected to because these claims depend on claims that refer to different features, i.e. more than one feature, namely, ink, process, substrate.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the questions whether the claims are fully supported by the description, are made:

1. Claim 13 and 15 are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because claims 13, 15, and 18-56 are indefinite for the following reason(s):

Claim 13 and claim 15 each recite that the image possesses "high" durability while claim 15 also recites "high" color definition. The scope of the claim is confusing because it is not clear what is meant by "high" or what durability or color definitions this encompasses.

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Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

1. Claims 3, 6, 10-13, 16-21, 23-24, 27-28, and 30-43 lack novelty under PCT Article 33(2) as being anticipated by Zou et al. (U.S. 6,140,391).

Zou et al. disclose ink possessing viscosity of 1.6-7 cP, electrical resistivity of 50-2000 ohm-cm, and sonic velocity of 1100-1700 m/s wherein the ink comprises non-aqueous ink carrier comprising alcohols, esters, ketones, and propylene glycol, 0.5-15% colorant, 0.5-30% polyol such as polyester polyol, polyether polyol, and oxidized castor oil, 0.5-30% aldehyde-based crosslinking agent such as melamine formaldehyde, catalyst that promotes reaction between the crosslinking agent, polyol, and substrate such as dinonylnaphthalene disulfonic acid, stabilizer, and surfactant. It is disclosed that the substrate contains functional groups such as carboxyl groups, hydroxyl groups, and amide groups and that the substrate includes plastics such as cellulose, nylon, polycarbonate, and acrylics. There is also disclosed process wherein ink is applied to substrate by ink jet printer followed by curing the image. Given that Zou et al. disclose ink as presently claimed, it is clear that the image formed from such ink would inherently possesses high durability, chemical fastness, and wash fastness (col.1, lines 4-8, col.3, lines 9-38, col.3, line 63-col.4, line 10, col.4, lines 41-48, col.5, lines 32-53, col.6, lines 7-20 and 25-30).

2. Claims 1, 6, 10, 12-13, and 30-40 lack novelty under PCT Article 33(2) as being anticipated by Rooney et al. (U.S. 5,349,021)

Rooney et al. disclose ink comprising 15-70% pigment, 1-15% crosslinking agent such as aldehyde-based and polyisocyanate, 0.5-6% acid catalyst such as toluenesulfonic acid, and 10-35% organic solvent such as glycols, alcohols, and glycol ethers. There is also disclosed process wherein the ink is printed onto substrate followed by curing. Given that Rooney et al. disclose ink as presently claimed, it is clear that the ink would inherently possess high durability, chemical fastness, and wash fastness (col.1, lines 6-8, col.1, line 54-col.2, line 13, col.2, line 39-col.3, line 5, col.3, lines 14-25 and 27-31, and col.10, lines 15-20).

3. Claims 1-2, 6, 10, 30-31, 33-35, and 37-40 lack novelty under PCT Article 33(2) as being anticipated by Xiao (U.S. 6,322,620).

4. Xiao discloses ink comprising 0.2-15% methoxymelamine crosslinking agent, 0.1-5% acid catalyst such as toluene sulfonic acid, pigment, and solvent such as glycol ethers. There is also disclosed process wherein the ink is printed onto substrate followed by curing. Given that Xiao discloses ink as presently claimed, it is clear that the ink would inherently possess high durability, chemical fastness, and wash fastness (col.1, lines 4-6, col.2, lines 20-30, 40-49, and 54-65).

4. Claim 22 lacks an inventive step under PCT Article 33(3) as being obvious over Zou et al. (U.S. 6,140,391) in view of Thompson et al. (U.S. 6,341,856).

The disclosure with respect to Zou et al. in paragraph 1 above is incorporated here by reference.

The difference between Zou et al. and the present claimed invention is the requirement in the claim of specific substrate.

Zou et al. disclose the use of ink on substrate comprising carboxyl groups.

Thompson et al., which is drawn to inks, disclose printing the inks on substrate including those containing carboxyl groups such as cotton in order to produce images with excellent lightfastness (col.4, lines 1-9).

In light of the motivation for using specific substrate disclosed by Thompson et al., it therefore would have been obvious to one of ordinary skill in the art to use such substrate in Zou et al. in order to produce images with excellent colorfastness, and thereby

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

arrive at the claimed invention.

5. Claim 25 lacks inventive step under PCT Article 33(3) as being obvious over Zou et al. (U.S. 6,140,391) in view of Ma et al. (U.S. 6,117,921).

The disclosure with respect to Zou et al. in paragraph 1 above is incorporated here by reference.

The difference between Zou et al. and the present claimed invention is the requirement in the claim of surface tension.

Zou et al. is silent with respect to surface tension.

Ma et al., which is drawn to ink jet inks as is Zou et al., disclose that inks suitable for ink jet process possess surface tension of 25-75 dyne/cm in order to produce ink with desired ink drop velocity, drop volume, and stream stability (col.8, lines 57-63).

In light of the above, it therefore would have been obvious to one of ordinary skill in the art to control the surface tension of the ink of Zou et al. to 25-75 dyne/cm, including surface tension as presently claimed, in order to produce ink suitable for ink jet printing, and thereby arrive at the claimed invention.

6. Claims 26 and 29 lack an inventive step under PCT Article 33(3) as being obvious over Zou et al. (U.S. 6,140,391) in view of Ma et al. (U.S. 6,117,921) and Smith et al. (U.S. 6,326,419).

The disclosure with respect to Zou et al. in paragraph 1 above is incorporated here by reference.

The difference between Zou et al. and the present claimed invention is the requirement in the claims of surface tension and particle size of the ink.

Zou et al. is silent with respect to the surface tension and particle size of the ink.

Ma et al., which is drawn to ink jet inks as is Zou et al., disclose that inks suitable for ink jet process possess surface tension of 25-75 dyne/cm in order to produce ink with desired ink drop velocity, drop volume, and stream stability (col.8, lines 57-63).

Smith et al., which is drawn to inks, disclose using ink with particle size less than 1 micron in order to avoid blocking or clogging of the printer nozzles (col.5, lines 51-56).

In light of the above, it therefore would have been obvious to one of ordinary skill in the art to control the surface tension of the ink of Zou et al. to 25-75 dyne/cm, including surface tension as presently claimed, and to use ink with particle size less than 1 micron in Zou et al. in order to produce ink suitable for ink jet printing that will not clog the printer nozzles, and thereby arrive at the claimed invention.

7. Claims 1-2, 4-5,7-8,10-11,14-18,23,30,33-34,37,43,49,50, and 55-56 lack an inventive step under PCT Article 33(3) as being obvious over Titterington et al. (U.S. 5,645,888) in view of Zou et al. (U.S. 6,140,391).

Titterington et al. disclose (i) base ink component comprising aqueous or nonaqueous ink carrier, colorant, crosslinkablility constituent, acid catalyst, plasticizer, and surfactant and (ii) curing component comprising silane crosslinking agent wherein the curing component is either aqueous or non-aqueous based. It is also disclosed that the base component can comprise the crosslinking agent while the curing component comprises the catalyst. There is further disclosed process wherein the curing component is applied to substrate followed by the base ink component (col.1, lines 9-17, col.4, lines 23-56, and col.5, lines 30-41).

The difference between Titterington et al. and the present claimed invention is the requirement in the claims of polyol.

Zou et al., which is drawn to inks, disclose the use of 0.5-30% polyol such as polyester polyol or polyether polyol in order to add flexibility to the film that forms when the ink cures in the printed substrate (col.4, line 65-col.5, line 11).

Given that Titterington et al. in combination with Zou et al. disclose ink as presently claimed, it is clear that the image formed from the ink would intrinsically possess high durability, chemical fastness, and wash fastness.

In light of the above, it therefore would have been obvious to one of ordinary skill in the art to use polyol in the ink of Titterington et al. in order to produce images with good flexibility, and thereby arrive at the claimed invention.

8. Claims 46-48 lack an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in paragraph 7 above and further in view of Ma et al. (U.S. 6,117,921).

The difference between Titterington et al. in view of Zou et al. and the present claimed invention is the requirement in the claim of surface tension.

Titterington et al. is silent with respect to surface tension.

Ma et al., which is drawn to ink jet inks as is Titterington et al., disclose that inks suitable for ink jet process possess surface tension of 25-75 dyne/cm in order to produce ink with desired ink drop velocity, drop volume, and stream stability (col.8, lines 57-63).

In light of the above, it therefore would have been obvious to one of ordinary skill in the art to control the surface tension of the ink of Titterington et al. to 25-75 dyne/cm, including surface tension as presently claimed, in order to produce ink suitable for ink jet printing, and thereby arrive at the claimed invention.

9. Claims 51, 52, and 54 lack an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in paragraph 7 above and further in view of Christian (U.S. 5,981,113).

The difference between Titterington et al. in view of Zou et al. and the present claimed invention is the requirement in the claim of specific wetting agent.

Titterington et al. disclose that the inks contain solvent but there is no explicit disclosure of the specific solvent utilized.

Christian et al., which is drawn to ink, disclose the use of wetting agent such as ethanol or isopropanol (col.4, lines 22-26).

In light of the above, it therefore would have been obvious to one of ordinary skill in the art to use such wetting agent in the ink of Titterington et al. in order to lower the surface tension of the ink and increase the tendency of the ink to coat the substrate, and thereby arrive at the claimed invention.

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In case the space in any of the preceding boxes is not sufficient.

10. Claims 51-54 lack an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in paragraph 7 above and further in view of Ma et al. (U.S. 6,117,921).

The difference between Titterington et al. in view of Zou et al. and the present claimed invention is the requirement in the claim of specific wetting agent.

Yang et al., which is drawn to inks, disclose the use of solvent such as hexane and heptane in order to produce a fast drying ink (col.3, lines 26-27 and 49).

In light of the above, it therefore would have been obvious to one of ordinary skill in the art to use solvent such as hexane or heptane in the ink of Titterington et al. in order to produce fast drying ink, and thereby arrive at the claimed invention.

11. Claims 9 and 44-45 meet the criteria set out in PCT Article 33(2)-(3), because the prior art, namely, Zou et al. (U.S. 6,140,391), Titterington et al. (U.S. 5,645,888), Rooney et al. (U.S. 5,349,021), and Xiao (U.S. 6,322,620) does not teach or fairly suggest process for printing an image on a substrate wherein the process comprises providing ink comprising first part comprising carrier, colorant, polyol, and agent capable of chemically interacting with the substrate and second part comprising wetting composition and catalyst or ink comprising first part comprising carrier, colorant, polyol, and catalyst and second part comprising wetting composition and agent capable of chemically interacting with substrate , contacting the substrate with second part of the ink to provide wet portion, and applying first part of the ink to the wet portion wherein the density of the second part of the ink in the wet portion ranges from about 0.01 per cm^2 to about 2 g per cm^2 as required in present claim 9 or any disclosure that the second part of the ink has surface tension lower than surface tension of first part of the ink as required in present claims 44-45.

12. Claims 1-56 meet the criteria set out in PCT Article 33(4), and thus the invention has industrial applicability because the subject matter claimed can be made or used in industry.

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.